

The NKS Programmes for Nordic cooperation on nuclear and radiological safety

Kasper G. Andersson^{1,2}, Kaisu Leino^{1,3}, Sigurður M. Magnússon^{1,4} & Finn Physant^{1,5}

¹ NKS, Roskilde, Denmark

² DTU Nutech, Roskilde, Denmark

³ Fortum Power and Heat Oy, Espoo, Finland

⁴ Icelandic Radiation Safety Authority, Reykjavik, Iceland

⁵ FRIT, Roskilde, Denmark

This is the first of three articles covering NKS and NKS activities. The second article to be published in the next issue of Radiation Regulator will focus on NKS activities in nuclear safety while the third article will focus on NKS activities in emergency preparedness.

Abstract

NKS is a platform for Nordic cooperation and competence maintenance in nuclear and radiological safety, including emergency preparedness. It is an informal forum serving as an umbrella for Nordic initiatives and interests. It runs joint activities of interest to financing organisations and other end-users.

Retrospective introduction

Nordic cooperation on issues related to nuclear and radiological safety dates back to the 1950's where the industrial potential of atomic energy first attracted Nordic governments, as this novel source of energy production was foreseen to be inexpensive and constitute virtually unlimited resources. In 1952, the Nordic Council was created with the purpose of reconstructing inter-Nordic ties after the Second World War, and although preparatory development in relation to nuclear power production was rather inhomogeneous among the different Nordic countries, a Nordic committee, the 'Kontaktorgan', was established in 1957 with a mandate to follow the further planning of nuclear power development in the Nordic area. This committee had a specific objective to promote initiatives between the Nordic countries to join forces in the further development.

In the early years, a major discussion issue dealt with in the 'Kontaktorgan' was the provision of the required nuclear materials, and soon both Nordic ministry representatives and scientists were deeply involved in the work of the committee. By 1977, a source of finance of cooperative research projects had emerged through the Nordic Council of Ministers, which had been established six years earlier as a complement to the Nordic Council. On this background, NKS (acronym for 'Nordisk KerneSikkerhedsforskning', or in English 'Nordic Nuclear Safety Research') was created, and over the decades that followed, this organisation has run a large number of research activity programmes. Initially these focused on the safety issues of nuclear power plant operation and waste management, but following the Three Mile Island accident in 1979 and the Chernobyl accident in 1986, the focus to some extent shifted to emergency management and prevention of accidents. Both components

remain main fields of work for today's NKS, although developments in Nordic societies have since then added a series of new focus areas, including NORM (naturally occurring radioactive materials) waste management and security and response in relation to potential malicious uses of radioactive substances.

Today, after numerous administrative changes and research programme models, NKS is owned jointly by national competent authorities, and receives additional financial support from a number of Nordic co-sponsor organisations.

Objectives and work areas

Owing to intertwined cultural history, geographical neighbourhood, similarities in language, environment and societal challenges, and a wish to gain through cooperation with equal partners, it seems natural for the Nordic countries to seek cross-border cooperation with each other. A requirement to realise the full potential of this scheme in the present context is a common view on nuclear and radiological safety including emergency preparedness. This, in turn, demands a common understanding of rules, practice and measures, which can vary between countries as well as with time. It is a main objective of NKS to facilitate the common Nordic view that keeps the relevant bonds viable between the Nordic countries.

Nordic authorities, nuclear power companies, scientists and various other stakeholders continuously keep in contact through the informal networks that NKS offers. This enables sharing of resources whereby the potential for responding to urgent issues is enhanced for the entire region. Problems can generally be tackled quicker, more efficiently, more consistently and at a lower cost through collaboration, bearing in mind that key competences are not equally distributed in the different Nordic countries.

On a more detailed level, there are for instance common Nordic challenges in relation to nuclear installations, where nuclear power plants are in operation in Finland and Sweden, and research reactors have been operated in Denmark, Finland, Norway and Sweden. There is an obvious benefit in exchanging ideas and technologies in relation to plant operation, and since a number of reactors in different Nordic countries are under decommissioning, a collaborative benefit can also be realised in that context. Sweden also has a nuclear fuel production plant, and its collaboration with other Nordic nuclear installations can also be beneficial. Further, a number of large radiological installations are projected in Nordic areas (e.g., the MAX-LAB/MAX IV synchrotron radiation source and the European spallation source ESS), where Nordic organisations are collaborating in addressing, e.g., potential environmental implications.

On the emergency preparedness side, the Fukushima accident in March 2011 was a reminder that large accidents at nuclear installations can lead to wide dispersion of radionuclides in the environment. In order to respond to nuclear or radiological emergencies, should they affect Nordic populations, it is necessary to maintain an operational emergency preparedness. By continuously improving detection, response and decision aiding tools while maintaining an informal collaborative network between relevant stakeholders in the Nordic countries (including nuclear power plant

experts), the capacity and capability to respond optimally to an emergency is enhanced. Today's emergency preparedness also needs to address prevention against and response to nuclear and radiological terror attacks.

NKS activities have the aims of improving Nordic nuclear and radiological safety, including emergency preparedness, maintaining informal cooperation networks between Nordic countries, disseminating information, and increasing competence in relevant fields. Ensuring required expertise for the future is a priority task, which NKS addresses by promoting involvement of students and young scientists in all its activities.

It needs to be stressed that NKS warmly encourages Nordic participation in parallel collaboration on other organisational (e.g., European) levels, which has resulted in many important products that have been adapted into the current Nordic nuclear and radiological safety plans.

Organisational structure

The joint owners and main financiers of NKS are the Danish Emergency Management Agency, the Finnish Ministry of Employment and the Economy, the Icelandic Radiation Safety Authority, the Norwegian Radiation Protection Authority, and the Swedish Radiation Safety Authority. Current co-financiers are Fennovoima Oy (Finland), Fortum Power and Heat Ltd. (Finland), TVO (Finland), Institute for Energy Technology (IFE; Norway), Forsmark Kraftgrupp AB (Sweden), Nuclear and Training and Safety Centre AB (KSU; Sweden), OKG AB (Sweden) and Ringhals AB (Sweden).

There are two scientific / technological programmes.

The NKS-R programme, which deals with

- reactor physics and safety,
- nuclear power plant life management and extension,
- decommissioning and handling of generated waste,
- organisational issues.

The NKS-B programme, which deals with

- nuclear and radiological emergency preparedness,
- measurement strategy, technology and quality assurance
- radioecology and environmental assessments,
- management of radioactive waste and discharges.

NKS activities

The two programmes are continuously renewed through an annual call for proposals for new activities, which is open to all relevant Nordic organisations. These activities run for 1 year. The activities may comprise research, investigations, exercises, conferences, seminars, workshops, courses, submission of scientific papers, etc., and it is a requirement that they all deliver a final report, which is published on the NKS

website (www.nks.org). A framework document for each programme is updated prior to each call for proposals, pinpointing general topics of particular relevance at the time. For instance, the importance of rapidly extracting learning points from the Fukushima accident experience was stressed. Owing to the flexibility of the organisation, a series of NKS activities had been launched within months of the accident, testing and evaluating parameter sensitivity in emergency preparedness models describing dispersion and migration of radionuclides in the air as well as in oceans, evaluating various emergency measurement systems and their capacities, and describing new means and strategies for communication between experts and the public. A series of final reports from these activities are now available on the NKS website, where all is free of cost. Although results are expressed with a view to Nordic conditions, NKS activity results often have relevance far beyond the Nordic communities.

The budget for the latest annual call (in October 2012) for activity proposals under the two programmes was nearly 1 million €. In addition to the funding provided directly by NKS for the activities, matching in-kind contributions are supplied by the organisations that participate in the activities, without which it would not be possible to run these NKS activity programmes.

Other types of activities are arranged and executed by the organisation itself from time to time. Joint NKS-R and NKS-B seminars have been arranged at intervals of a few years, and in January 2013, a topical seminar was held in Stockholm, dealing with the Fukushima accident and its perspectives for Nordic reactor safety and emergency preparedness. Here a total of 26 presentations were given to an audience of 140 participants (presentations are available at http://nks.org/en/seminars/presentations/nks_fukushima_seminar.htm). International perspectives were covered by Abel González (Vice Chair of ICRP), Wolfgang Weiss (Chair of UNSCEAR), André-Claude Lacoste (President of ASN), and Tero Varjoranta (General Director of STUK). Among many other things, the presentations given over the two seminar days demonstrated that even a nuclear accident that occurs so far away that it has no radiological implications for Nordic areas can be very resource demanding for the competent Nordic authorities and experts, and decisions taken in remote areas may influence conditions in countries where the radiological impact is not trivial. Also differences between Nordic national recommendations for citizens in contaminated areas were highlighted and discussed. Altogether, many lessons could be drawn with respect to management of emergencies, some of which related to the specific Nordic preparedness systems, whereas others were of a more generic nature (e.g., that releases from nuclear power plants are not necessarily discrete events). Scope was identified for even closer collaboration between Nordic countries in the emergency preparedness area. It was also clarified which implications the accident has so far had for nuclear power plant operation in the different Nordic countries, and which future measures can be expected. Many of the useful new ideas that emerged during the seminar could, and hopefully will, be transformed into research applications for the next call for NKS activity proposals in the autumn.



André-Claude Lacoste giving his presentation at the NKS Fukushima seminar in Stockholm (Photo: Manne Kjellander, MAURI FILM).

Conclusions

The NKS organisation has existed since 1977 and has run hundreds of research activities in fields comprising reactor safety, decommissioning, nuclear and radiological emergency preparedness, and management of radioactive waste. It has over many years provided a forum for Nordic cooperation and networking, while developing advanced technologies and methods that have been used both inside and outside the Nordic areas.

Authors (left to right): Kasper G. Andersson (NKS-B Programme Manager), Kaisu Leino (NKS-R Programme Manager), Sigurður M. Magnússon (NKS Chairman), Finn Physant (NKS Chief Accountant).



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